



Job Number: SVGJ-160267
 Company: PDC
 Lease/Well: Hinkle 23-5
 Location: Weld County, CO
 Rig Name: MS Slickline 2788
 RKB: 0'
 G.L. or M.S.L.: GL

State/Country: Colorado/USA
 Declination: 8.31°
 Grid: East To True North
 File name: W:\2016\PDC\GJ\HINKLE\235.SVY
 Date/Time: 20-Oct-16 / 11:07
 Curve Name: Surface - 6850' M.D. (Rate Gyro)
 Lat: 40.339381 Long: -104.576536

MS Energy

WINSERVE SURVEY CALCULATIONS
 Minimum Curvature Method
 Vertical Section Plane .00
 Vertical Section Referenced to Wellhead
 Rectangular Coordinates Referenced to Wellhead

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
100.00	.57	336.17	100.00	.46	-.20	.46	.50	336.17	.57
200.00	.46	348.25	199.99	1.30	-.48	1.30	1.39	339.64	.15
300.00	.37	16.16	299.99	2.01	-.48	2.01	2.06	346.66	.22
400.00	.33	17.92	399.99	2.59	-.30	2.59	2.61	353.46	.04
500.00	.33	20.16	499.99	3.13	-.11	3.13	3.14	358.00	.01
600.00	.39	15.86	599.99	3.73	.08	3.73	3.73	1.27	.07
700.00	.40	17.58	699.98	4.39	.28	4.39	4.40	3.67	.02
800.00	.40	31.81	799.98	5.02	.57	5.02	5.05	6.49	.10
900.00	.44	33.90	899.98	5.64	.97	5.64	5.72	9.75	.04
1000.00	.48	32.12	999.98	6.31	1.41	6.31	6.47	12.56	.04
1100.00	.49	34.64	1099.97	7.02	1.87	7.02	7.26	14.93	.02
1200.00	.49	29.64	1199.97	7.74	2.33	7.74	8.08	16.73	.04
1300.00	.37	357.71	1299.97	8.43	2.52	8.43	8.80	16.66	.26
1400.00	.31	315.63	1399.96	8.95	2.32	8.95	9.25	14.55	.25

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
1500.00	.29	292.60	1499.96	9.24	1.90	9.24	9.43	11.62	.12
1600.00	.26	290.27	1599.96	9.42	1.45	9.42	9.53	8.77	.03
1700.00	.26	306.26	1699.96	9.63	1.06	9.63	9.69	6.27	.07
1800.00	.35	327.99	1799.96	10.02	.71	10.02	10.05	4.07	.15
1900.00	.41	358.32	1899.96	10.64	.54	10.64	10.65	2.91	.21
2000.00	.45	18.10	1999.95	11.37	.65	11.37	11.39	3.28	.15
2100.00	.43	18.59	2099.95	12.10	.89	12.10	12.13	4.22	.02
2200.00	.45	19.52	2199.95	12.83	1.14	12.83	12.88	5.10	.02
2300.00	.66	356.34	2299.94	13.77	1.24	13.77	13.83	5.14	.30
2400.00	1.22	346.95	2399.93	15.38	.96	15.38	15.41	3.58	.58
2500.00	1.51	351.70	2499.90	17.72	.53	17.72	17.73	1.72	.31
2600.00	1.65	353.08	2599.86	20.46	.17	20.46	20.46	.47	.15
2700.00	1.69	351.83	2699.82	23.35	-.22	23.35	23.35	359.47	.05
2800.00	1.76	350.75	2799.78	26.32	-.67	26.32	26.33	358.54	.08
2900.00	1.69	343.33	2899.73	29.25	-1.34	29.25	29.28	357.37	.23
3000.00	1.46	319.35	2999.69	31.63	-2.59	31.63	31.73	355.31	.69
3100.00	1.14	320.63	3099.67	33.36	-4.06	33.36	33.61	353.07	.32
3200.00	.75	336.71	3199.65	34.73	-4.95	34.73	35.08	351.90	.47
3300.00	.81	6.38	3299.65	36.04	-5.13	36.04	36.40	351.90	.40
3400.00	1.01	21.55	3399.63	37.56	-4.72	37.56	37.86	352.83	.31
3500.00	1.10	28.58	3499.62	39.22	-3.94	39.22	39.42	354.26	.16
3600.00	1.07	35.64	3599.60	40.82	-2.94	40.82	40.93	355.88	.14
3700.00	1.10	39.60	3699.58	42.32	-1.78	42.32	42.36	357.59	.08
3800.00	1.51	41.91	3799.55	44.04	-.29	44.04	44.04	359.62	.41
3900.00	1.44	37.39	3899.52	46.02	1.35	46.02	46.04	1.68	.14
4000.00	1.31	41.62	3999.49	47.87	2.88	47.87	47.96	3.44	.16
4100.00	.92	51.00	4099.47	49.23	4.26	49.23	49.42	4.94	.43
4200.00	.78	55.16	4199.46	50.13	5.44	50.13	50.42	6.20	.15
4300.00	.48	61.05	4299.46	50.72	6.37	50.72	51.12	7.15	.31
4400.00	.45	62.59	4399.45	51.10	7.08	51.10	51.59	7.89	.03
4500.00	.35	53.55	4499.45	51.47	7.68	51.47	52.03	8.48	.12
4600.00	.12	27.55	4599.45	51.74	7.97	51.74	52.35	8.76	.25
4700.00	.20	128.37	4699.45	51.72	8.16	51.72	52.36	8.96	.25
4800.00	1.18	186.25	4799.44	50.59	8.18	50.59	51.25	9.18	1.09
4900.00	2.13	167.79	4899.40	47.75	8.46	47.75	48.50	10.05	1.08

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E		Dogleg Severity Deg/100
							Distance FT	Direction Deg	
5000.00	1.74	167.69	4999.34	44.45	9.18	44.45	45.39	11.67	.39
5100.00	1.59	166.21	5099.30	41.62	9.83	41.62	42.77	13.29	.16
5200.00	1.28	159.44	5199.27	39.23	10.56	39.23	40.62	15.06	.35
5300.00	1.12	162.46	5299.25	37.25	11.24	37.25	38.91	16.79	.17
5400.00	.95	162.09	5399.23	35.53	11.79	35.53	37.44	18.36	.17
5500.00	1.10	168.66	5499.21	33.80	12.24	33.80	35.95	19.90	.19
5600.00	1.09	173.34	5599.20	31.91	12.53	31.91	34.29	21.44	.09
5700.00	.99	174.03	5699.18	30.11	12.73	30.11	32.69	22.92	.10
5800.00	.80	152.98	5799.17	28.63	13.14	28.63	31.50	24.66	.38
5900.00	.64	159.81	5899.16	27.48	13.65	27.48	30.69	26.41	.18
6000.00	.75	156.40	5999.15	26.36	14.11	26.36	29.90	28.15	.12
6100.00	.94	161.07	6099.14	24.98	14.63	24.98	28.95	30.36	.20
6200.00	.92	144.86	6199.13	23.55	15.36	23.55	28.12	33.12	.26
6300.00	.98	131.77	6299.11	22.33	16.46	22.33	27.74	36.40	.22
6400.00	1.20	139.36	6399.10	20.96	17.78	20.96	27.49	40.31	.26
6500.00	1.30	134.58	6499.07	19.37	19.27	19.37	27.32	44.85	.14
6600.00	1.59	136.50	6599.04	17.57	21.04	17.57	27.41	50.13	.29
6700.00	2.10	136.06	6698.99	15.24	23.26	15.24	27.81	56.77	.51
6800.00	2.53	136.22	6798.91	12.33	26.06	12.33	28.83	64.68	.43
Last Survey Depth Recorded									
6850.00	2.92	137.37	6848.85	10.60	27.69	10.60	29.64	69.06	.79